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John A. Ventosa
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NL-12-088

June 21, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop O-P1-17
Washington, D.C. 20555-0001

SUBJECT: Licensee Event Report # 2010-009-01, "Automatic Reactor Trip Due to a Turbine Generator Trip Caused by a Fault of the 21 Main Transformer Phase B High Voltage Bushing"
Indian Point Unit No. 2
Docket No. 50-247
DPR-26

Reference: 1. LER-2010-009 submitted by letter NL-11-005 dated January 18, 2011

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2010-009-01. The attached LER is a revision to an LER submitted per Reference 1 that identified an event where the reactor was automatically tripped, which is reportable under 10 CFR 50.73(a)(2)(iv)(A) . As a result of the reactor trip, the Auxiliary Feedwater System was actuated, which is also reportable under 10 CFR 50.73(a)(2)(iv)(A). This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP2-2010-06801. The initial root cause was identified as indeterminate. This LER revision incorporates changes as a result of revisions to the Root Cause Analysis that identified the root cause for the event.

There are no new commitments identified in this letter. Should you have any questions regarding this submittal, please contact Mr. Robert Walpole, Manager, Licensing at (914) 254-6710.

Sincerely,

JAV/cbr

cc: Mr. William Dean, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 2
Mrs. Bridget Frymire, New York State Public Service Commission
LEREvents@inpo.org

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NRR

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES: 10/31/2013

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
INDIAN POINT 2	05000-247	1 OF 7

4. TITLE: Automatic Reactor Trip Due to a Turbine-Generator Trip Caused by a Fault of the 21 Main Transformer Phase B High Voltage Bushing

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV. NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	7	2010	2010-	009 -	01	6	21	2012		05000
									FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE: 1

10. POWER LEVEL: 100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Christopher Ingrassia, System Engineering	(914) 254-7047

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	EL	XFMR	S125	Y	X	FK	LS	W120	Y

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO				

16. ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced type written lines)*

On November 7, 2010, an automatic reactor trip (RT) was initiated as a result of a turbine-generator trip due to actuation of the main generator primary and back-up lockout relays. All control rods fully inserted and all primary systems functioned per design except for the 138 kV Station Auxiliary Transformer tap changer. The plant was stabilized in hot standby with decay heat being removed by the main condenser {SG}. Based on reports of two explosions an Alert was declared in accordance with the emergency plan which was terminated at 22:18 hours. There was no radiation release. The Emergency Diesel Generators did not start as offsite power remained available. The Auxiliary Feedwater System automatically started as expected due to SG low level from shrink effect. The direct cause of the RT was due to actuation of the 86P and 86BU relays that sensed a fault from the failure of 21 main transformer (MT) as a result of a low impedance fault of the 345 kV Phase B bushing. The root cause was an internal failure of the phase B bushing due to a vendor design/manufacturing deficiency. Corrective actions include replacement and acceptance testing of the 21 MT, external visual inspections of the 22 MT HV bushings, Unit Auxiliary Transformer (UAT), Iso-phase bus and 345 kV feeder W95, testing of the 22 MT, UAT, Iso-phase bus and HV components. Damaged HV components were replaced. The bushings for the 21 and 22 MT were replaced with another manufacturers bushing. The event had no effect on public health and safety.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 2	05000-247	2010	- 009 -	01	2 OF 7

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

Note: The Energy Industry Identification System Codes are identified within the brackets {}.

DESCRIPTION OF EVENT

On November 7, 2010, during 100% steady state reactor power, an automatic reactor trip (RT) {JC} occurred at 18:39 hours, due to a turbine-generator trip as a result of a fault on the 21 main transformer (MT) (XFMR){EL}. All control rods {AA} fully inserted and all plant systems and equipment functioned per design except for the 138 kV Station Auxiliary Transformer (SAT) tap changer which stuck at step 16 rise. This occurred during the attempted "fast transfer" of the 6.9 kV buses 1, 2, 3 and 4 from the Unit Auxiliary Transformer (UAT) to the SAT on a loss of main generator output, which feeds the UAT. The plant was stabilized in hot standby with decay heat being removed by the main condenser {SG}. There was no radiation release. The Emergency Diesel Generators (EDG) {EK} did not start as adequate offsite power remained available. The Auxiliary Feedwater System (AFWS) {BA} automatically started as expected due to Steam Generator (SG) {AB} low level from shrink effect as a result of the RT from full power. At 18:49 hours, Emergency Plan Emergency Action Level (EAL) 8.2.3 was entered based on reports of two explosions in the transformer yard potentially impacting safety related components and an Alert was declared. The Alert was terminated at 22:18 hours. An investigation into the cause of the event and a post transient evaluation was initiated. The event was recorded in the Indian Point corrective action program (CAP) as Condition Report CR-IP2-2010-06801. The SAT tap changer hang-up was recorded in CR-IP2-2010-06802.

At approximately 18:39 hours, the Central Control Room (CCR) received a turbine trip for the reactor trip first out annunciation. At approximately 18:40 hours, CCR operators entered emergency procedure 2-E-0 (Reactor Trip or Safety Injection). At approximately 18:41 hours, the CCR received reports of a fire/explosion/smoke in the unit 2 transformer yard. CCR operators actuated the fire alarm and dispatched the Fire Brigade to the transformer yard. At 18:43 hours, the CCR was notified the transformer deluge system was activated and no fire or smoke was noted. CCR operators entered 2-ES-0.1 (Reactor Trip Response). At approximately 18:45 hours, the CCR received a report from the Fire Brigade Leader of a second explosion that originated from inside the 21 MT while the Fire Brigade was mobilizing equipment. At 19:00 hours, Technical Specification (TS) 3.8.1 (AC Sources-Operating) Condition A was entered for one offsite circuit inoperable due to the SAT tap changer hang up. TS 3.8.1 was entered because it contains a note requiring the automatic transfer function for the 6.9 kV buses to be operable whenever the 138 kV offsite power circuit is supplying 6.9 kV bus 5 and 6 and the UAT is supplying 6.9 kV bus 1,2, 3, and 4. The TS 3.8.1 note is to ensure that safeguards power train 2A/3A (480 volt buses 2A and 3A) will be transferred automatically from the UAT (main generator) to 6.9 kV buses 5 and 6 (138 kV offsite circuit) following a plant trip. On November 8, 2010, at 2:52 hours, TS 3.8.1 was exited. At 5:23 hours, on November 8, 2010, the plant entered Mode 4 (Hot Shutdown). Following failure of the 21 MT, dielectric oil from the MT leaked into the transformer spill containment structure and mixed with the fire deluge water and overflowed into the transformer yard and penetrated the east wall of the Turbine Building. The transformer fault actuated the following generator, 22kV, and 345kV relays which actuated the generator protection system Primary and Backup Lockout relays (86P and 86BU) initiating a turbine trip: Overall Unit Differential Phase B relay (87/GTB), MT Differential phase B and C relays (87/T21B and 87/T21C), Generator Overfrequency Primary and Backup relays (81P/1 and 81BU/2), 345 kV Primary and Backup Ground Fault Detector relays (50NP/345 and 50NBU/345), 345 kV primary and backup Phase Fault Detector relays (50P/345 and 50BU/345), Primary and Backup Pilot Wire Protection on Feeder W95 relays (87L1/345 and 87L2/345), B-Phase Main Transformer Differential relay (87/T21B) and C-Phase Main Transformer Differential relay (87/T21C). The turbine trip resulted in a direct RT.

An investigation determined the event was initiated when the 21 MT experienced a low impedance ground fault on the 345 kV Phase B bushing. The fault was initiated from inside the transformer and originated from the Phase B high voltage (HV) bushing. As a result of the Phase B bushing fault, the 21 MT experienced a rapid increase in pressure which caused an explosion resulting in failure of the transformer tank. Combustible gases created by arcing in the transformer insulating oil built up in the transformer until enough oxygen mixed with the hot gases to cause a secondary explosion. A cooling valve cracked draining most of the oil from the tank. Inspections of the transformer identified the Phase B HV link was broken at the stand-off insulator above the radiators. Internal inspections found the transformer windings and connections in good condition with no evidence of overheating. The bushing flanges were found cracked on all three HV bushings. The inboard end (oil side) of the phase B bushing was found severely damaged. The inboard end housing (epoxy-resin insulator) of the phase B bushing was found completely shattered and ejected from the bushing both inside and outside the tank. Most of the bushing conductive and insulating paper was torn, unraveled, removed from the bushing conductor and scattered throughout the transformer internals and outside the transformer. Excessive arc striking was noticed at the bushing bottom terminal and on the transformer tank wall and turret. The bushing lower corona shield was found shifted downward, exposing the bushing bottom. No loose connections were found on the B phase HV bushing conductors. The phase C HV bushing also sustained damage but not as severe as the Phase B bushing. The epoxy-resin was shattered off the bushing. The corona shield was slightly shifted downward and the bottom terminal of the bushing was exposed. The Phase A HV bushing showed little or no visible damage with arcing noticed on the base of the conductor.

The main generator supplies electric power at 22 kV through an isolated phase bus to two MTs. The MTs step up the voltage to 345 kV and transmit the electric power to the Buchanan switchyard. The 21 and 22 MTs were manufactured by Siemens {S125} and replaced the original MTs in 2006. The 21 MT is a three phase, forced air cooled, forced oil cooled, power transformer rated for 22 kV/345 kV operation. The HV leads are brought out of the transformer through bushings in the cover of the transformer tank. The transformers primary and secondary windings are immersed in dielectric oil. The 21 MT is one of two main generator output transformers designed to step up the three phase 22 kV output by the generator to 345 kV for power transmission to the electric power grid. The failed phase B HV bushing is one of three insulated conductors for connecting the transformer internal output to the exterior HV transmission lines. The transformer bushings are a Trench Electric Type COTA style #1175-F020-23-AG3-02 HV bushing. The bushings are fixed conductor, condenser type oil impregnated bushings whose construction has oil impregnated paper with layers of aluminum foil. A Doble test of the bushings was completed at the transformer manufacturing facility in 2005, after installation of the MTs in 2006, and on April 7, 2008. The tests results were similar to name plate data for the bushing. Investigation of maintenance records of the 21 MT including oil samples, Doble testing and gas analysis showed all maintenance and oil sampling was performed as scheduled and did not detect any abnormal conditions. A review of the 21 MT Serveron (online monitoring system) sample results did not show any sudden or significant increases in any of the available key combustible gases including the last sample taken two hours prior to the event. A review of grid conditions prior to the event did not reveal any grid transients or disturbances. An analysis of the data from the Disturbance Fault Recorder (DFR) and the protective relaying that actuated identified the initiating event to be internal to the transformer and due to a failure of the phase B bushing.

The failure of the 21 MT phase B bushing was catastrophic without any precursors as Doble testing, on-line gas monitoring, and dissolved gas in oil analysis (DGA) were acceptable prior to the event.

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

The extent of condition performed for the event included components electrically connected to the 21 MT which may have been impacted by the fault (22 MT, UAT, Isophase bus). The main generator was excluded as the manufacturer noted the fault value was within IEEE limits. An external visual inspection of the 22 MT HV bushings, UAT, Iso-phase bus and 345 kV W95 line was performed with no deficiencies identified. Damaged HV components were replaced. Protective relays that actuated were calibrated satisfactory. The extent of cause is limited to the MT HV Trench Electric Type COTA bushings which are installed on the 21 and 22 MTs and the phase B bushing on the 32 MT at unit 3. The phase B bushing of the 32 MT was visually inspected and the results were satisfactory. The last test of the 32 MT phase B bushing was completed satisfactorily on April 2, 2009.

An investigation of the SAT tap changer hang-up determined a limit switch (LS-120) {LS} was out of position. An alignment of the switch was performed and the automatic tap changer function was returned to service.

An equipment failure inspection including teardown and evaluation was performed on the failed phase B HV bushing (Trench Type COTA with a fixed copper conductor rated at 345kv and 2000A) and all remaining bushings of the same make and style as the failed bushing (two remaining bushings of the 21 MT, two bushings of the 22 MT, one bushing of the 32 MT). The teardown of the failed 21 MT phase B bushing revealed a puncture hole in the inboard end of the bushing that radiated outward to the bushings ground flange. When the bushing was unwound, electrical treeing was observed in the insulating paper at the high stress edges of the foil layers. Electrical treeing compromises the axial and radial breakdown strength of the paper layers since these are three-dimensional structures. As the insulation quality breaks down, the electrical withstand strength decreases between adjacent paper layers. At some point, dielectric breakdown between layers will occur. Breakdown between layers results in an avalanche condition wherein full-scale breakdown progresses rapidly and without warning. With electrical treeing, the insulation structure of the bushing can not withstand its normal voltage stresses. The presence of electrical treeing is what lead to the rapid and complete breakdown of the insulation system. The inspection of the other two 21 MT bushings (phase A and phase C) identified the same electrical treeing. The electrical treeing was also observed in two of the bushings removed from the 22 MT and one removed from the 32 MT. Based on the inspection findings, all Trench Type COTA 345kV bushings are susceptible to the electrical treeing phenomenon and potential failure. The Trench Type COTA 345kV bushings were replaced with new bushings of a different design by a different manufacturer.

Cause of Event

The direct cause of the RT was a turbine-generator trip due to the failure of the 21 MT caused by a low impedance fault of the Phase B HV bushing. The phase B bushing fault actuated protective relays which actuated the generator protection system primary and backup lockout relays (86P and 86BU) initiating a turbine trip which resulted in a direct RT. The phase B bushing fault propagated to the phase C bushing and resulted in arcing on the bottom conductor of the phase A bushing and extensive damage to the corona shields of the phase B and C bushings. There are no industry Operating Events (OE) relevant to Trench COTA type HV bushings that were installed on the 21 MT

The root cause is an internal insulation failure of the phase B bushing due to a vendor design/manufacturing deficiency. The bushing insulation is manufactured by cutting foil edges which results in sharp edges that do not control the electrical stresses at the foil/paper interface.

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

The cutting method results in sharp edges that do not control the electrical stresses at the foil/paper interface. These stresses cause electrical treeing in the insulation paper. Other manufacturers use precision cutting techniques to cut the foil and fold over the edges. These techniques result in smooth rounded edges that control and minimize the electrical stresses. In addition, during bushing assembly the foils are manually placed into position using only a template for alignment whereas other manufactures use devices such as laser alignment. The manual method can result in misplaced foils which can alter the capacitive grading thus potentially further weakening the already treed insulation system. Electrical treeing in the paper at the high stress edges of the foil layers lead to a rapid breakdown of the bushing insulation system.

Corrective Actions

The following corrective actions have been or will be performed under Entergy's Corrective Action Program to address the cause and prevent recurrence:

- The 21 MT was replaced with a spare transformer of the same type and manufacturer with Trench COTA style bushings. Acceptance testing of the replacement 21 MT was performed satisfactorily.
- External visual inspections of the 22 MT bushings were performed and no signs of damage was identified.
- External visual inspections were completed satisfactorily on the UAT and Iso-phase bus.
- 22 MT HV bushings oil samples were obtained from the HV Trench COTA style bushings for DGA. Results were satisfactory.
- The 22 MT and associated bushings, the UAT and associated bushings, and the Iso-phase bus were tested. Results were satisfactory.
- Damaged HV components were replaced.
- The original lightening arrestors were cleaned, re-installed and tested satisfactory.
- A visual inspection of 345 kV line W95 was performed with no deficiencies identified.
- An equipment failure analysis of the phase A, B, and C bushings was performed and the result reviewed by engineering and any necessary additional corrective actions identified
- The Trench Electric Type COTA bushings for the 21, and 22 MTs were replaced with bushings manufactured by HSP Type SETFta.
- The Trench Electric Type COTA bushing in the 32 MT phase B was replaced with an ABB Type O Plus C bushing.
- The Phase B cable drop from the Turbine building to the transformer fire wall was replaced.

Event Analysis

The event is reportable under 10CFR50.73(a)(2)(iv). The licensee shall report any event or condition that resulted in manual or automatic actuation of any of the systems listed under 10CFR50.73(a)(2)(iv)(B). Systems to which the requirements of 10CFR50.73(a)(2)(iv)(A) apply for this event include the Reactor Protection System (RPS) including RT and AFWS actuation.

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

This event meets the reporting criteria because an automatic RT was initiated at 18:39 hours, on November 7, 2010, and the AFWS actuated as a result of a low SG level. On November 7, 2010, at 19:07 hours, a 1-hour emergency notification was provided under 10CFR50.72(a)(1)(i) for declaration of an alert due to the transformer failure characterized as an explosion which resulted in a RT (Event #46400). The alert condition was recorded in CR-IP2-2010-06803. At 22:00 hours, a 4-hour non-emergency notification was made to the NRC as an update to the initial notification (Event #46400) for an actuation of the reactor protection system {JC} while critical and included an 8-hour notification under 10CFR50.72(b)(3)(iv)(A) for a valid actuation of the AFWS.

As all primary safety systems functioned properly there was no safety system functional failure reportable under 10CFR50.73(a)(2)(v). Initially no transformer oil was observed on the discharge canal or the Hudson River but on November 8, 2010, an oil film was observed on the discharge canal and river. This condition was recorded in CR-IP2-2010-06806. On November 8, 2010, at 12:28 hours, the NRC was notified as an update to the initial event notification (EN #46400) that an offsite notification under 10CFR50.72(b)(2)(xi) reported to the New York State Department of Environmental Conservation (DEC) and the National Response Center that approximately 50 to 100 gallons of oil from the transformer reached the Hudson River. This condition was recorded in CR-IP3-2010-03467.

Past Similar Events

A review of the past three years of Licensee Event Reports (LERs) for events that involved a RT from a failure of the HV electric power system identified no applicable LER. However, Unit 3 LER-2007-002 reported a RT due to a failure of the 31 Main Transformer Phase B bushing on April 6, 2007. The root cause was indeterminate as the catastrophic failure destroyed most of the evidence. Engineering postulated that the bushing fault developed internal to the bushing possibly due to thermal cycling of the bushing during its years of service that lead to gas bubbles (voids) in the bushing oil. The gas bubbles resulted in dielectric breakdown due to partial discharge until the breakdown was severe enough to result in failure to condense the voltage. The 345 kV then exited at the weakest point and arced to the steel transformer tank leaving a hole in the bushing conductor and rapid increase in combustible gases. The most probable cause was a design weakness associated with condenser type U GE bushings used in Phase B whose design can lead to conditions affecting dielectric insulation. The phase B bushing was installed as a replacement in 1976. The unit 3 event is similar in terms of bushing failures but the transformer and bushings associated with the 21 MT are new, of a different design, did not show any degradation, and has no known design problems.

Safety Significance

This event had no effect on the health and safety of the public.

There were no actual safety consequences for the event because the event was an uncomplicated reactor trip with no other transients or accidents. All plant systems and equipment functioned per design except for the 138 kV SAT tap changer. The SAT condition required one offsite circuit to be declared inoperable per TS 3.8.1. Adequate 138 kV offsite power was available via the SAT and no EDGs were required to power safeguards buses. The Auxiliary Feedwater System automatically started as expected due to SG low level from shrink effect.

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

There were no significant potential safety consequences of this event under reasonable and credible alternative conditions. The RPS is designed to actuate a RT for any anticipated combination of plant conditions including a direct RT on a turbine trip (TT). The analysis in UFSAR Section 14.1.8 concludes an immediate RT on TT is not required for reactor protection. A RT on TT is provided to anticipate probable plant transients and to avoid the resulting thermal transient. If the reactor is not tripped by a TT, the over temperature delta temperature (OTDT) or over power delta temperature (OPDT) trip would prevent safety limits from being exceeded. This event was bounded by the analyzed event described in UFSAR Section 14.1.8 (Loss of External Electrical Load). The response of the plant is evaluated for a complete loss of steam load from full power without a direct RT. The analysis shows that the plant design is such that there would be no challenge to the integrity of the reactor coolant system or main steam system and no core safety limit would be violated.

For this event, rod controls were in Auto and all rods inserted upon initiation of the automatic RT. The AFWS actuated and provided required FW flow to the SGs. RCS pressure remained below the set point for pressurizer PORV or code safety valve operation and above the set point for automatic safety injection actuation. Pressurizer level remained on scale. Following the RT, the plant was stabilized in hot standby.

Although the SAT tap changer hang-up resulted in one offsite power circuit being declared inoperable, adequate offsite power remained available to power safeguards buses. Offsite power is supplied from the offsite transmission network to the plant AC electrical power distribution system by two offsite circuits: a 138 kV circuit and a 13.8 kV circuit, each of which has a preferred and backup feeder. All offsite power to the safeguards buses enters the plant via 6.9 kV buses 5 and 6 which are normally supplied by the 138 kV circuit but may be supplied by the 13.8 kV circuit. During plant operation, 6.9 kV buses 1-4 receive power from the main generator via the UAT. Following a unit trip, 6.9 kV buses 1-4 will auto transfer (dead fast transfer) to 6.9 kV buses 5 and 6 in order to receive offsite power. 6.9 kV buses 2, 3, 5, and 6 supply power to the 480 volt safeguards buses (2A/3A, 5A, 6A) using 6.9 kV/480 volt station service transformers. The 138 kV offsite circuit satisfies the requirement of 10CFR50, Appendix A, General design Criterion 17 that at least two required circuits can, within a few seconds, provide power to safety related equipment following a Design Basis Accident. The 138 kV offsite circuit has a dedicated SAT that can be supplied by either the preferred feeder (95332) or the backup feeder (95331). Adequate offsite feeders were available. The SAT automatic tap changer is operated under load to maintain secondary voltage to properly power the 6.9 kV buses. In automatic the tap changer utilizes a voltage regulator to maintain proper voltage by automatically selecting the appropriate tap. The tap changer position is monitored by a limit switch and a hang-up relay. When the limit switch fails to open within a specified time limit, the SAT Tap changer hang-up alarm actuates in the CCR. Upon a unit trip the tap changer immediately begins raising voltage until a specified voltage is reached or the bus tie breakers are closed. Once the tie breakers close and the transformer is loaded, any additional tap changer motion is unnecessary. In this event the SAT tap changer stuck at high voltage side thereby providing adequate voltage to power the 6.9 kV and 480 volt buses.